Photo: David Foote; *Drosophila heteroneura*

Terrestrial Invertebrates

True Flies

Order Diptera

ORDER INCLUDES:
25 Native Families
87 Native Genera
2,000+ Native Species
1,061+ Endemic Species

GENERAL INFORMATION: All flies, except wingless species, have two pairs of wings; one pair is functional, the other (known as halteres) is highly modified. Because of their importance in genetic research, Dipterans are well-studied. The initial founders of Hawaiian populations are believed to have reached the islands on birds or by being caught in wind currents. Numerous adaptive shifts and unusual evolutionary developments characterize the species found in Hawai'i, and close to one-fifth of the world's known species of *Drosophila* are endemic to Hawai'i. The most specious genera include *Campsicnemus*, *Drosophila*, *Scaptomyza*, and *Lispocephala*. Species in the genus *Drosophila* are perhaps the best-known dipterans because of the scientific interest in the group's genetics and adaptive radiations. Most species are found in native wet forests at an elevation of approximately 925 meters (3,000 feet). The species in the genus are specialized microbivores that rely on over 40 families of native plants, with 37 percent of the species in the genus dependent on plants in the family Araliaceae. Recent declines within the genus are associated with the loss of these host plants. Pigs (*Sus scrofa*) degrade habitat and facilitate the spread of non-native *Drosophila*. Non-native western yellow jacket (*Vespula pensylvanica*) also prey on native *Drosophila*. Currently 12 species are candidates for federally listed as endangered. Successful conservation efforts include pig removal from native forests.

DISTRIBUTION: Dipterans are known from all the MHI.

ABUNDANCE: Unknown. A lack of systematic surveys prevents any population estimate. However, the loss of native habitats likely means that species within the order are declining.

LOCATION AND CONDITION OF KEY HABITAT: Flies occur in a variety of freshwater and terrestrial habitats.

THREATS:

- Habitat loss and degradation due to conversion for agriculture, logging, grazing, and disturbance by a suite of non-native ungulates, and the introduction of invasive plants.
- Non-native predators, including ants, wasps, crustaceans, and fish.
- Insufficient information, especially for rare species hampers conservation efforts.

CONSERVATION ACTIONS: The goals of conservation actions are not only to protect current populations and key breeding habitats, but also to establish additional populations, thereby reducing the risk of extinction. In addition to common statewide and island conservation actions, specific management directed toward flies should include:

- Conduct surveys to determine the distribution and abundance of known fly species and to document and identify new species.
- Preserve, maintain, and restore habitats supporting existing populations.
- Initiate studies on life history, distribution, and critical habitats to better direct conservation measures.

MONITORING:

- Continue surveys to monitor status of known populations in order to asses their stability and trends.

RESEARCH PRIORITIES:

- Survey for additional, new populations.
- Survey to determine status of species believed to be extinct.
- Conduct studies to document the biology, habitat requirements, and life history of poorly-known, native species.

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